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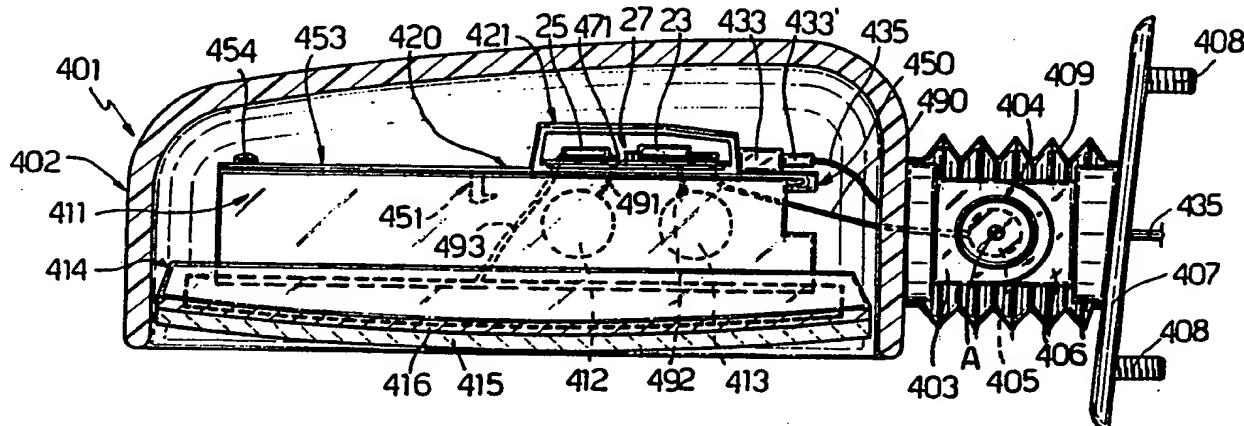
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(71) Applicant (for all designated States except US):	ROLTRA-MORSE S.P.A. [IT/IT]; Via Albenga, 9, I-10090 Cascine Vica-Rivoli (IT).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (Utility model), DE (European patent), DK (European patent), ES (Utility model), ES (European patent), FR (European patent), GB, GB (European patent), IT (European patent), JP (Utility model), LU (European patent), NL (European patent), SE (European patent), US.
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(75) Inventors/Applicants (for US only):	BRUSASCO, Enzo [IT/IT]; Corso Re Umberto, 64, I-10129 Torino (IT). BOERO, Giuseppe [IT/IT]; Via Solferino, 5, I-10060 Cандидо (IT).		With international search report.

**(54) Title: AN ELECTRIC ACTUATION DEVICE FOR A VEHICLE EXTERNAL REARVIEW MIRROR**



**(57) Abstract**

An electric actuation device for a vehicle external rearview mirror (401), of the type comprising a pair of electric motors (412, 413) for the orientation movement of a reflecting element (415) of the mirror (401) with respect to an external casing body (402), and an electric motor (405) for orientation movement of this external casing body (402) with respect to a vehicle door, including a specific electronic control unit (27) for controlling these electric motors (412, 413, 405), in which this electronic unit (27) includes a first integrated circuit (23) for distribution of electric power for operation of the electric motors (412, 413, 405), and a second integrated circuit (25) for handling information signals relating to the operation of these motors (412, 413, 405), these integrated circuits (23, 25) being connected to a printed circuit (471) which is housed in a portion (421) of the frame (420) fixed within the external housing body (402) of the mirror (401).

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AN ELECTRIC ACTUATION DEVICE FOR A VEHICLE

EXTERNAL REAR VIEW MIRROR

TECHNICAL FIELD

The present invention relates to an electric actuation device for a vehicle external rear view mirror, and in particular to a device of the type in which a pair of DC electric motors driven in a known way, in two orthogonal planes, control the adjustment of the orientation of a reflecting sheet with respect to an external casing containing the device, and another electric motor controls the adjustment of the orientation of this external casing with respect to the fixed support on the vehicle, and moreover, of the type in which a heating device for defrosting can be coupled to the reflecting sheet.

15 BACKGROUND ART

As is known, currently for controlling such electric rear view mirrors fitted on motor vehicles, use is made in practice of a wiring system using dedicated cables for supplying electricity to the motors and to the heater device, which extend from a common central control unit for various actuator devices such as window winders, door locks etc, which include relay units, limiter circuits etc. This wiring system involves various disadvantages among which are: the complexity and difficulty of positioning bundles of cables, the large number of electrical connections, the difficulty of identification in the case of breakdowns, the complexity of functional

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testing of the installation during and/or after assembly on the vehicle.

DISCLOSURE OF INVENTION

The object of the present invention is that of providing

5 an electric actuation device for a vehicle external rear view mirror, particularly for a motor vehicle, which can be produced and assembled very simply with a high degree of reliability of good operation and which is suitable for use with a control and drive system which overcomes the

10 15 above-indicated disadvantages, in particular a system of the type described in Italian Patent application entitled "A Control and Drive System for a Plurality of Electrical Devices in a Vehicle" filed on the same date.

15 According to the present invention there is provided an electrical actuation device for a vehicle external rear view mirror, comprising at least one electric motor for the orientation movement of at least one element of the said mirror with respect to a support element,

20 characterised by the fact that it includes a specific electronic control unit for the said electric motor.

BRIEF DESCRIPTION OF DRAWINGS

For a better understanding of the present invention a particular embodiment thereof will now be described,

25 purely by way of non-limitative example, with reference to the attached drawings, in which:

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Figure 1 is a partially sectioned upper view of an external rear view mirror for a vehicle, incorporating the electric actuation device formed according to the principles of the present invention;

5 Figure 2 is a rear view of the rear view mirror of Figure 1;

Figure 3 is an upper view of an electronic control unit for the external rear view mirror of Figure 1; and

10 Figure 4 is a partially sectioned side view of the electronic unit of Figure 3.

BEST MODE FOR CARRYING OUT THE INVENTION

With reference to Figures 1 and 2, the reference numeral 401 generally indicates an external rear view mirror for vehicles, which comprises, in a substantially known way,  
15 an external cup-shape casing body 402 which carries a lateral leg 403 which is pivoted, by means of a rotation actuator 404 about a vertical axis A-A, including a DC electric motor 405, to a fixed leg 406 secured to a plate 407 adapted to be fixed with screws 408 onto the vehicle,  
20 conveniently to a door (in a known way not illustrated). These legs 403 and 406, and the rotation actuator unit 404, are covered by a protection bellows 409. The electric motor 405 therefore allows angular orientation adjustments of the cup-shape casing 402 with respect to  
25 the plate 407, and therefore with respect to the door.

Within the cup-shape casing 402 there is fixed a main

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frame 411 which houses two DC electric motors 412 and 413 the drive spindles of which are connected, in a known way, to a movable secondary frame 414 which carries a reflecting sheet 415 which is disposed in the frontal 5 aperture region of the cup-shape casing 402; to the rear surface of this reflecting sheet 415 there is fitted a heater element 416, of known type, conveniently in the form of a sheet having resistive characteristics. These electric motors 412 and 413 therefore make it possible to 10 adjust the angular orientation of the movable frame 414 and therefore of the reflecting sheet 415 in two perpendicular planes B-B and C-C.

According to the present invention, a frame 420 is fixed 15 onto the main frame 411, which frame is shown in more detail in Figures 3 and 4, and has a box-like portion 421 with a base wall 422, two parallel side walls 423, a shaped upper wall 424, and a side wall 425 joining the side walls 423, which together form an internal cavity 426 20 open opposite the side wall 425. From one side of the base of the box-like portion 421 externally extends a U-shape projection 450, whilst from the opposite side extends externally the second hook-like projection 451 and a flat projection 453 of relatively greater length; this 25 frame 420 is disposed on one side of the main frame 411 (Figure 1) and the hook-like projection 451 engages into a corresponding seat in the frame 411, whilst the U-shape

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projection 450 locks against a side wall of the frame 411 and the flat projection 453 is fixed onto the side of the frame 411 against which it engages, by means of a screw 454 which is disposed in a hole 455 near the end of the 5 projection 453. Within the cavity 426 there is housed an electronic control unit 27 for controlling the electric motors 405, 412, 413 and the heater element 416 according to the system described in the said Italian Patent application entitled "A Control System for a Plurality of 10 Electrical Devices on a Vehicle" the contents of which are incorporated herein by reference. In particular, the block 27 includes a printed circuit board 471 which is disposed with its lateral edges lodged within respective grooves 429 formed towards the lower region of the side 15 walls 423 (Figure 4).

To the printed circuit 471 are connected:

- three electrical contact elements 430, 431 and 432, conveniently of the blade type, which are housed in an 20 insulating connector 433 which is formed integrally with the side wall 423, on one side of this, above the projection 450; this connector 433 is adapted to couple with a corresponding connector block 433' connected to the end of an electrical cable 435 having three electrical 25 conductors the first of which is a positive electrical supply line, the second of which is an information signal transmission line, and the third of which is an earth

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connection line. This electrical cable 435 conveniently leads from a main central control unit, comprising a microprocessor, to the mirror 401, passing through a vehicle door; and

- 5 - a first integrated circuit 23, provided with a heat dissipator 480, for distribution of electrical power supply to the electric motors 405, 412, 413 and the heater element 416, via respective electrical wires 490, 491, 492 and 493, and a second integrated circuit 25 for dealing
- 10 with information signals relating to the operation of these motors 405, 412, 413 and the heater element 416. These integrated circuits 23 and 25 can conveniently include specific logic circuits or a microprocessor, solid state switches etc, and can constitute a current or
- 15 voltage overload protection circuit, monitoring and diagnostic circuits etc, even in combination with other discrete circuit components 495, also connected to the printed circuit 471.

#### INDUSTRIAL APPLICABILITY

- 20 The advantages obtained with the electric actuation device of the present invention are evident from what has been described in that the electronic unit 27, which allows the information signals relating to the functions of adjustment of the mirror 401 and controlling the
- 25 distribution of electric power supply for operation of the electric motors 405, 412, 413 and the heater element 416 significantly simplifies the assembly and reliability of

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the control and drive system by the considerable reduction in the number of connection cables as well as the associated connections; moreover this electronic unit 27 makes it possible to provide a malfunction diagnostic 5 function both for a greater safety in operation of a vehicle, in that possible anomalies can be indicated in good time to the driver, and for a reduction in repair times in that an indication of the type of anomaly can be given to the repair engineer. All this translates 10 obviously into a simplification of testing both in the assembly line and at the end of the assembly line. The provision of a specific electronic unit 27 for the mirror 401 further allows the type of operation of the adjustment devices to be varied simply by modification of the 15 specific electronic unit and the programme resident in the central unit. The housing of this electronic unit 27 is further achieved in an economic manner with a simple frame 420 which can easily be fitted to the conventional internal main frame 411 of the mirror and without having 20 substantially to alter the dimensions of the cup-shape body 402.

Finally, it is clear that the embodiment of the present invention described and illustrated can have modifications 25 and variations introduced thereto which do not depart from the ambit of the inventive idea contained in it. For example the configuration of this frame 420 can be varied

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as can the manner of housing of the integrated circuits 23 and 25 as well as the configuration of the mirror 401, which can also be formed without the adjustment device 404 and/or the heater element 416.

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CLAIMS

1. An electric actuation device for a vehicle external rear view mirror (401), comprising at least one electric motor (405, 412, 413) for orientation movement of at least one element (415, 402) of the said mirror (401) with respect to a support element (402, 407), characterised by the fact that it includes a specific electronic control unit (27) for controlling the said electric motor (405, 412, 413).
2. A device according to Claim 1, characterised by the fact that the said electronic unit (27) includes at least one integrated circuit (23, 25).
3. A device according to Claim 2, characterised by the fact that the said electronic unit (27) includes at least a first integrated circuit (23) for the distribution of electrical power supply for operation of the said electric motor (405, 412, 413), and at least a second integrated circuit (25) for dealing with information signals relating to the operation of the said motor (405, 412, 413).
4. A device according to Claim 2 or Claim 3, characterised by the fact that the said electronic unit (27) includes logic circuits.

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5. A device according to any preceding Claim,  
characterised by the fact that the said specific  
electronic control unit (27) includes diagnostic and/or  
signalling means for indicating possible breakdowns of the  
5 said device.

6. A device according to any preceding Claim,  
characterised by the fact that the said electronic unit  
(27) has a connector (433) having three external  
10 connection elements (430, 431, 432) for connection to an  
electric connection cable (435) including a first power  
level positive electrical power supply conductor, a second  
information signal transmission conductor, and a third  
earth connection conductor.

15

7. A device according to any preceding Claim,  
characterised by the fact that the said electronic unit  
(27) is housed in a portion (421) of the frame (420)  
belonging to the said device.

20

8. A device according to Claim 7, characterised by the  
fact that the said electronic unit (27) includes a  
plurality of components (23, 25) connected to a printed  
circuit (471), the said printed circuit (471) being housed  
25 in the said portion (421) of the said frame (420).

9. A device according to Claim 7 or Claim 8,

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characterised by the fact that the said frame (420) is fitted within an external container body (402) of the said mirror (401).

5 10. A device according to any preceding Claim, characterised by the fact that it includes at least one electric motor (412, 413) for adjusting the orientation of a reflecting element (415) with respect to an external container body (402) of the said mirror (401).

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11. A device according to any preceding Claim, characterised by the fact that it includes at least one electric motor (405) for adjusting the orientation of an external casing body (402) of the said mirror (401) with 15 respect to the said vehicle.

12. A device according to any preceding Claim, characterised by the fact that the said specific electronic control unit (27) also controls the electrical 20 supply to a heater element (416) of the said reflecting element (415).

13. A device according to any preceding Claim, characterised by the fact that the said mirror (401) is 25 fitted to a vehicle door.

14. A vehicle external rear view mirror, characterised by

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the fact that it includes an electric actuation device according to any preceding Claim.

15. A motor vehicle characterised by the fact that it  
5 includes an external rear view mirror according to Claim  
14.

16. An electric actuation device for a vehicle external  
rear view mirror, a rear view mirror incorporating the  
10 said device, and associated vehicle incorporating the said  
mirror, as described with reference to the attached  
drawings.

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Fig.1

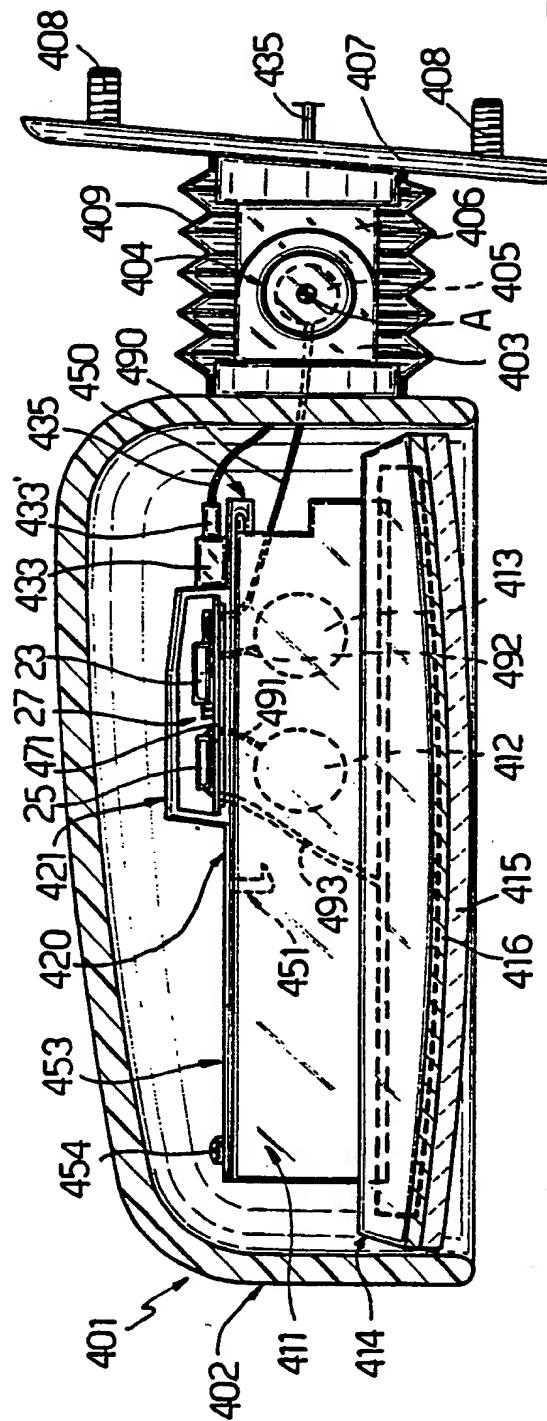
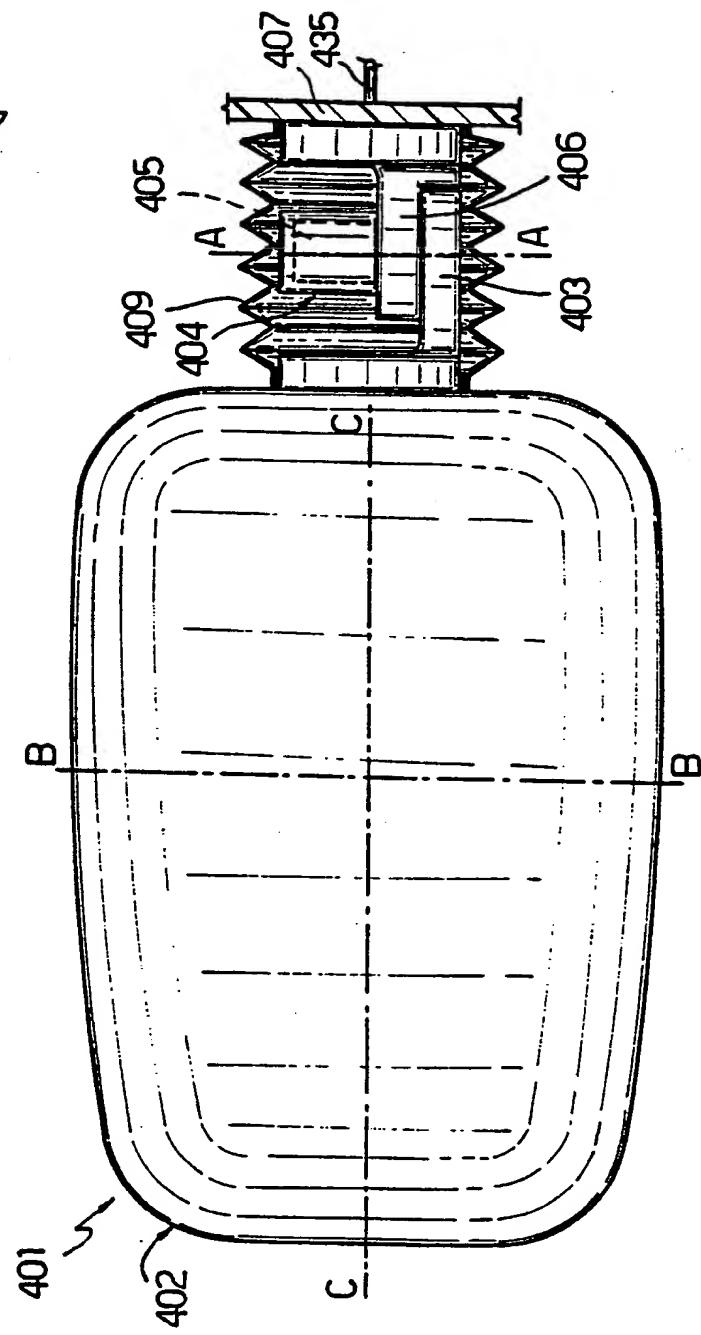


Fig.2



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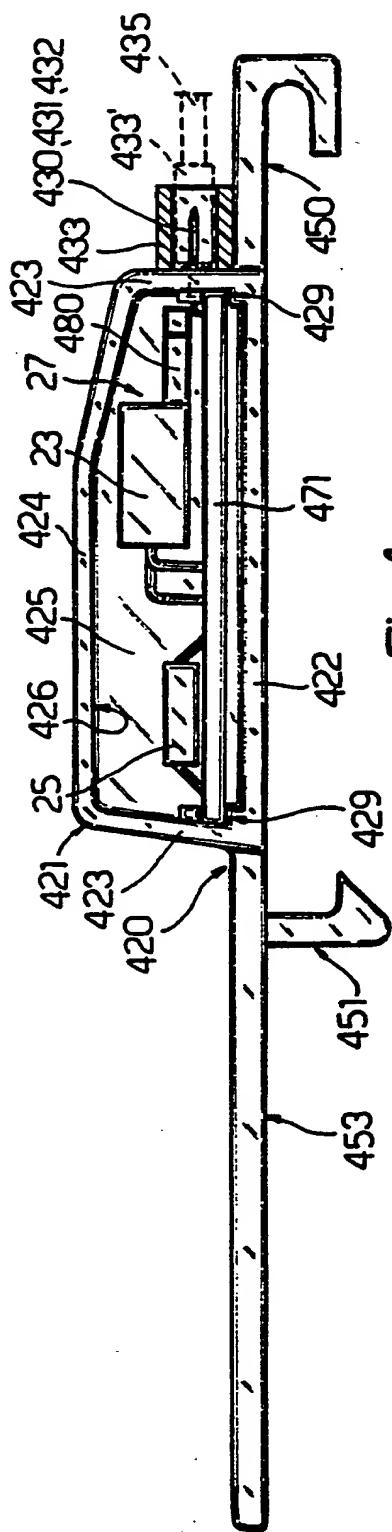
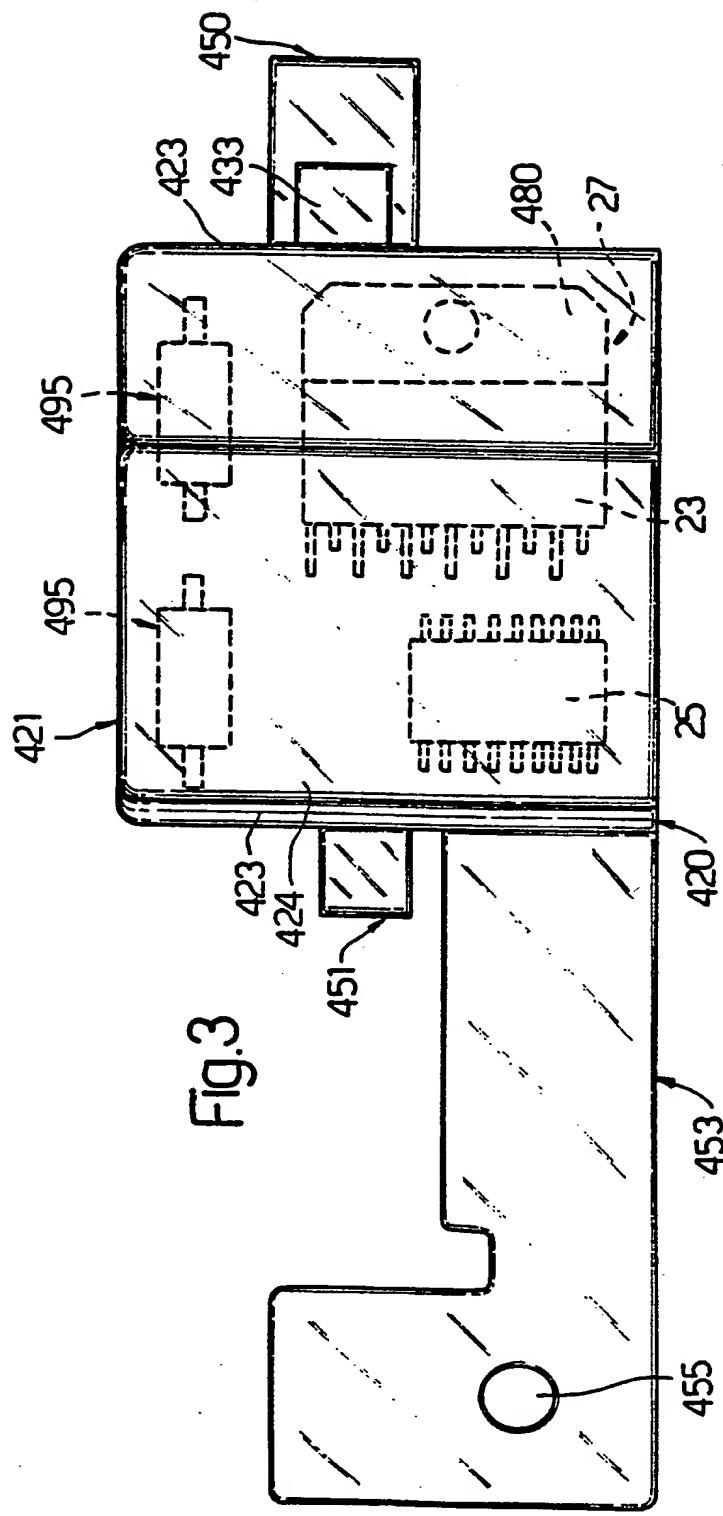


Fig. 4



3.  
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT 90/00021

## I. CLASSIFICATION OF SUBJECT MATTER

(if several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.C1. 5

B60R1/06

## II. FIELDS SEARCHED

Minimum Documentation Searched?

Classification System	Classification Symbols
Int.C1. 5	B60R

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>

Category <sup>10</sup>	Citation of Document, if with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	EP, A, 274848 (BRITAX WINGARD LIMITED) 20 July 1988 see the whole document	1, 2, 4, 6, 10-15
Y	---	3, 5
Y	FR, A, 2585200 (JAEGER) 23 January 1987 see page 8, line 1 - page 14, line 3; figures 2, 3 see page 16, lines 2 - 7	3
Y	PATENT ABSTRACTS OF JAPAN vol. 10, no. 270 (M-517)(2326) 13 September 1986, & JP-A-61 94850 (NISSAN MOTOR CO LTD) 13 May 1986, see the whole document	5
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\* Special categories of cited documents :<sup>10</sup>

- "A" document defining the general state of the art which is not considered to be of particular relevance
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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

11 JUNE 1990

Date of Mailing of this International Search Report

27.06.90

International Searching Authority

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## III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	US,A,4746206 (KUSZTOS ET AL.) 24 May 1988 see column 4, line 13 - column 5, line 68; figures 5-7	1, 2, 4, 10, 14, 15
Y	---	7-9
Y	GB,A,2076763 (RIV-SKF OFFICINE DI VILLAR PEROSA S.P.A.) 09 December 1981 see page 1, lines 108 - 115; figures 1, 2 see page 2, lines 11 - 22 see page 2, lines 54 - 59 see page 2, lines 76 - 85	7-9
P,X	DE,A,3923174 (K.K. TOKAI RIKA DENKI SEISAKUSHO) 01 February 1990 see column 1, line 1 - column 5, line 42; figures 1, 2	1-4, 7-10, 13-15
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ANNEX ~~2~~ THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

PCT/IT 90/00021  
SA 35282

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-274848	20-07-88	JP-A-	63159155	02-07-88
		US-A-	4871953	03-10-89
FR-A-2585200	23-01-87	EP-A-	0213992	11-03-87
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